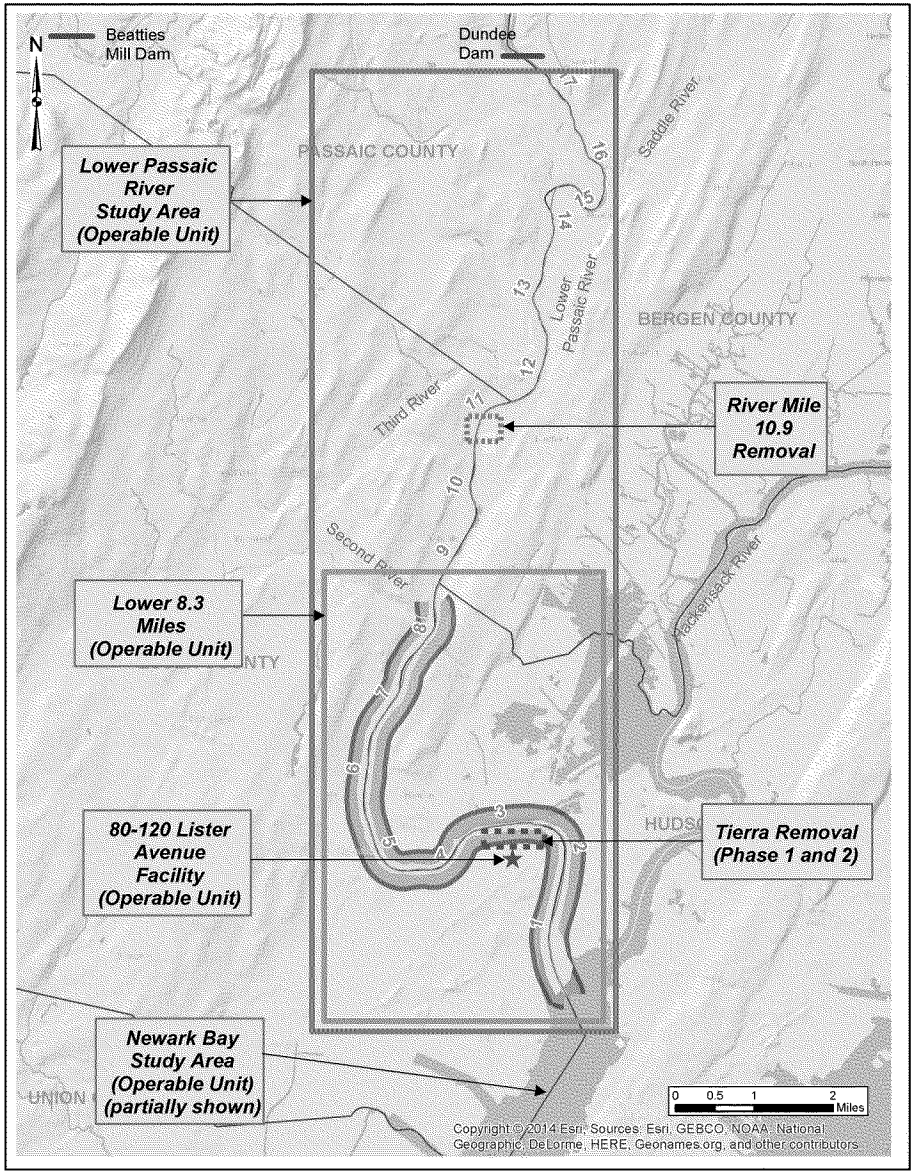
DRAFT

Diamond Alkali OU4: 17 Mile Lower Passaic River Study Area
Proposed Interim Remedy for Source Control

November 2017

Diamond Alkali Superfund Site

- Four Operable Units:
  - OU1: 80-120 Lister Avenue
  - OU2: Lower 8.3 miles of the Lower Passaic River
  - OU3: Newark Bay Study Area
  - OU4: 17-Mile Lower Passaic River Study Area



Summary of Operable Units and Actions

- OU1: 80-120 Lister Avenue
  - Contaminated soils, groundwater and materials at former Diamond Alkali facility
  - Action: Interim remedy complete - capping, subsurface slurry walls, and GW collection and treatment
- OU2: Lower 8.3 miles of the Lower Passaic River
  - Sediment of the Lower 8.3 Miles of the Lower Passaic River
  - Record of Decision (ROD) signed in March 2016; Remedial Design (RD) AOC signed September 2016
    - Bank-to-bank dredging (generally two feet; deeper in Navigation Channel), and engineered cap
    - Off-site disposal of dredged sediment in permitted disposal facilities
  - Action: Remedial Design (RD) ongoing by Occidental Chemical (PRP with responsibility for Diamond Alkali discharges), scheduled to be completed in 2020; Remedial Action (RA) scheduled to be implemented 2020 - 2026
- OU3: Newark Bay Study Area
  - Sediments and surface water of Newark Bay and portions of Hackensack River, Arthur Kill and Kill van Kull
  - Action: Remedial Investigation (RI) and Feasibility Study (FS) on-going; ROD scheduled for 2021
- OU4: 17-mile LPRSA
  - Sediments above RM 8.3 and surface water river-wide
  - Action: RI being completed, and Interim Remedy for Source Control proposed by Cooperating Parties Group (CPG, which include many of PRPs for this action, but not Occidental nor municipal entities)

- Other Actions
  - "Tierra" Removal Action (adjacent to OU1)
    - Non-time-critical removal to remove 200,000 cy of heavily contaminated sediment from RM 3.0 to RM 3.8
      - Phase 1 – 40,000 CY (completed' performed by Tierra Solutions on behalf of Occidental and Maxus)
      - Phase 2 – 160,000 CY (not scheduled)
  - RM 10.9 Removal
    - Time-critical removal to dredge/cap sediments to reduce risks posed by high concentrations of dioxins, PCBs and other contaminants (completed; performed by CPG)

Ongoing 17-Mile Lower Passaic River Study Area RI/FS

- **Activity Summary by Year**
  - **2004** – Settlement Agreement signed with CPG members for EPA to conduct RI/FS
  - **2004 to 2007** - EPA conducts RI/FS
  - **2007** - CPG members enter into new AOC with EPA and CPG takes over RI/FS
  - **2008 to 2014** – CPG conducts RI sampling
  - **2014 and 2015** – CPG submits draft version of RI/FS documents
- **Document Summary**
  - **Baseline Human Health Risk Assessment** – Draft submitted June 2014; Final submitted July 2017 approved
  - **Baseline Ecological Risk Assessment** – Draft submitted June 2014; Revised Draft expected December 2017
  - **RI Report** – Draft submitted February 2015; Revised Draft expected December 2017
  - **FS Documents** – Drafts submitted April 2015 and comments presented to CPG; further work on hold - **Interim Remedy proposed by CPG July 2017**

CPG Proposed Interim Remedy

- Phased approach to address the Upper 9-Miles using Adaptive Management
- ROD #1: Interim Source Control Remedy to include --
  - Dredging and capping of "hotspots" exceeding proposed Remedial Action Levels (RALs)
  - Post-remediation monitoring
- Allows use of infrastructure that will be constructed for OU2 RA
- Proposed RALs: 300 ppt dioxin and 1 ppm PCBs
  - Removes sediment that serves as a source (posing the greatest risks or preventing the rest of the river from recovering)
  - Concentrations that will remain in the river are characterized as Surface Weighted Average Concentrations (SWAC)
- Approx. 83 acres from RM 8.3 to RM 14.7 to be dredged & capped
  - Areas planned to be dredged will be further characterized and defined after more data collection during the pre-design investigation
- ROD #2: Performance monitoring conducted after the Interim ROD #1 dredging will be used to determine whether additional actions are required, or if a final ROD can be issued.

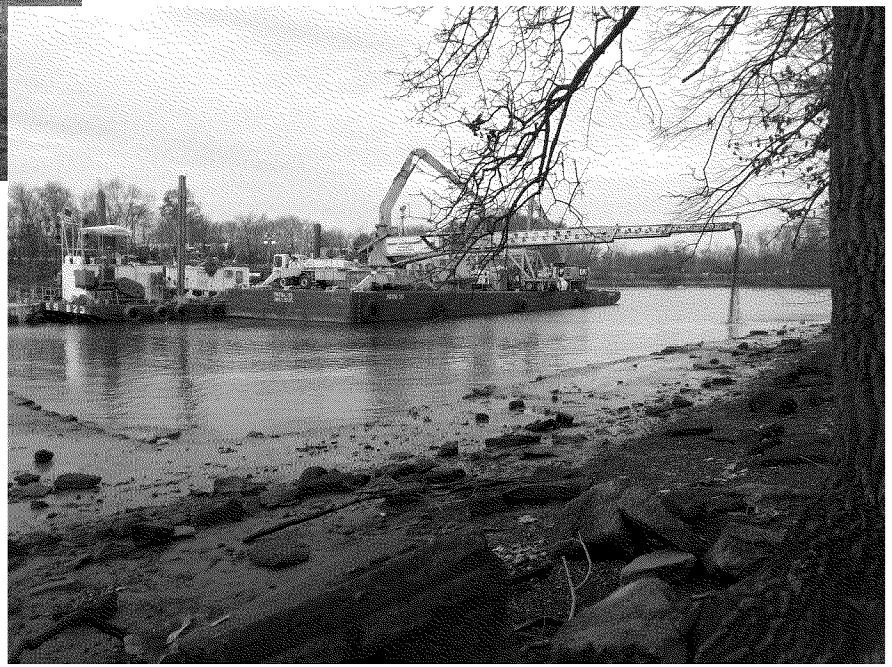
Previous OU4 "Hotspot" Removal – RM 10.9

- Mechanical dredging - August 7, 2013 through October 4, 2013
  - 16,238 cubic yards (CY) dredged
- Subsequent to dredging, cap installed - November 5, 2013 through May 29, 2014*
    - Sand habitat top layer
    - 12± inches of armor stone
    - geotextile
    - 10± inches of active bottom layer
- Cost of 5.6 acre action = approximately $22 Million
- Monitoring:
  - Third sampling event to evaluate effectiveness of cap (completed June 2016)
  - Physical monitoring of cap integrity occurs yearly and after high flow events

* Poor weather conditions and difficulty placing the geotextile extended the cap installation duration

River Mile 10.9 Time-Critical Removal Action

September 28, 2013, scow pulled alongside the excavator. Dredged sediments were loaded directly into the scow

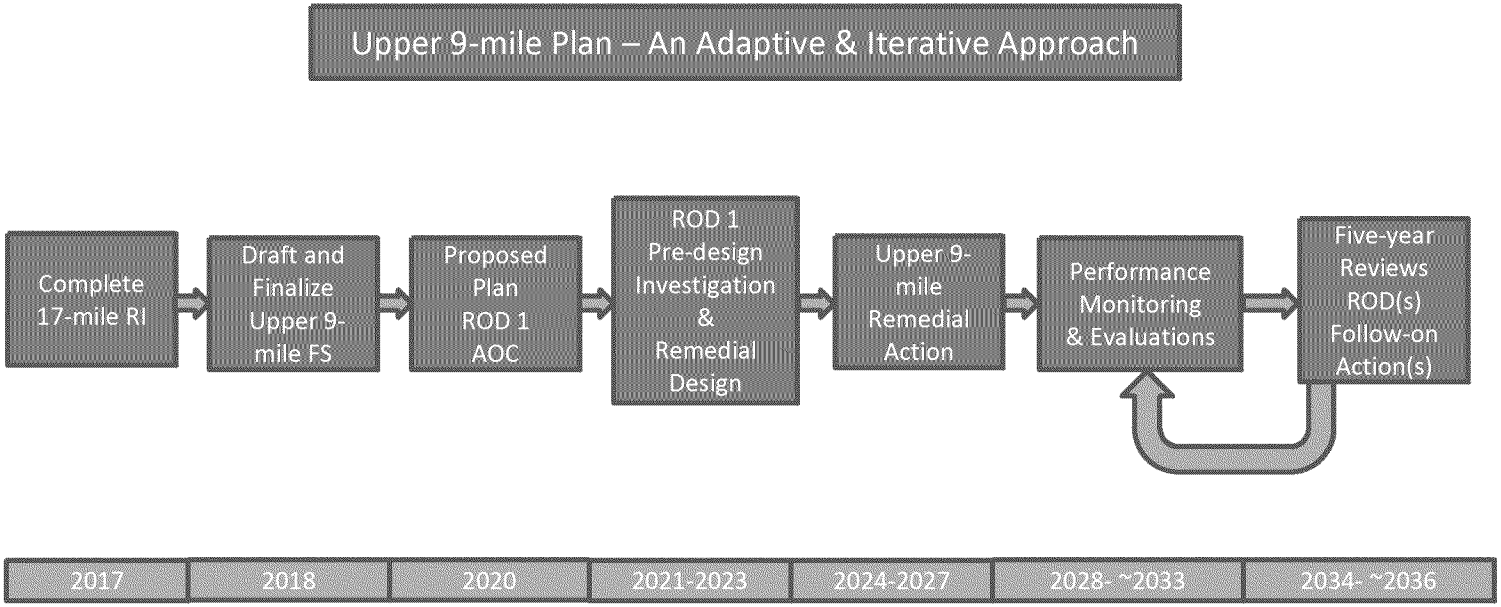


November 22, 2013, placing the cap layer using the Telebelt® system. The edge (lip) of the dredge cut is visible in the foreground

Issues to be Discussed with CPG

- Interpolated concentrations (i.e., conditional simulations) may not accurately represent current concentration distributions being used to predict remediation areas
  - Additional sampling performed during Pre-Design Investigation will refine estimates
    - The accuracy of estimated concentrations is a function of the spatial variability and sampling density
- Ways to optimize the area to be dredged:
  - Varying RALs
    - Based on depositional/erosional areas
    - Based on forage areas
    - Other?
  - Determine Dredge Unit (DU) average concentration from composite of multiple samples rather than a single sample from the center of the DU
- CPG recovery estimates based on modeling appear to be ambitious
  - Further model improvements and simulations should be used to refine estimates

Schedule



Support for Proposed Interim Remedy for Source Control

CPG Group (approximately 50 parties)

Initial briefings:

- NJDEP: Briefly discussed this approach on 11/2/17
  - Follow-up call scheduled with NJDEP senior management
- CSTAG: Briefing on 11/8; full CSTAG meeting planned for February 2018

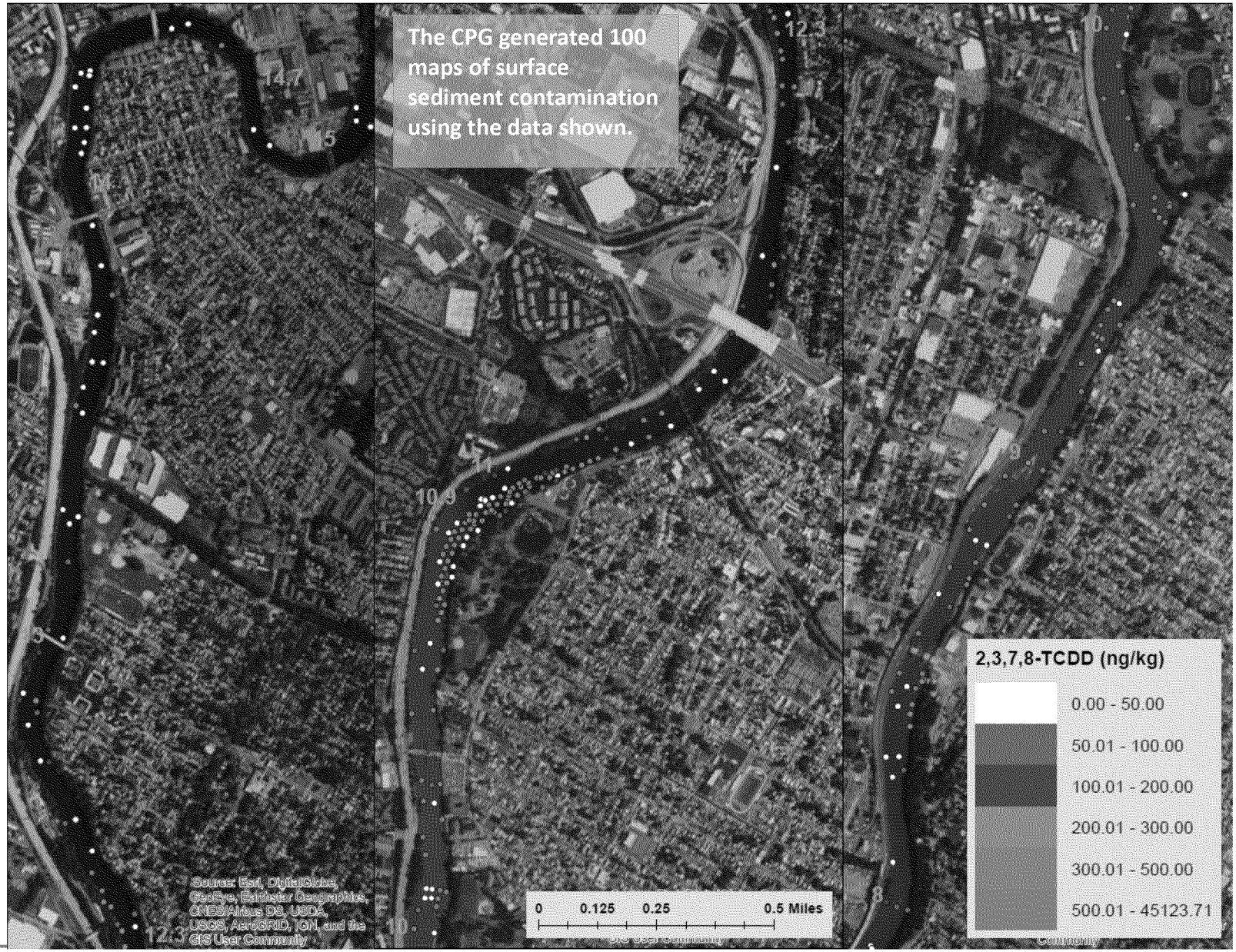
Upcoming briefings:

- NOAA, FWS, State Trustees: Meeting scheduled for 12/11/17
- Community Advisory Group: Bimonthly meeting 1/11/18

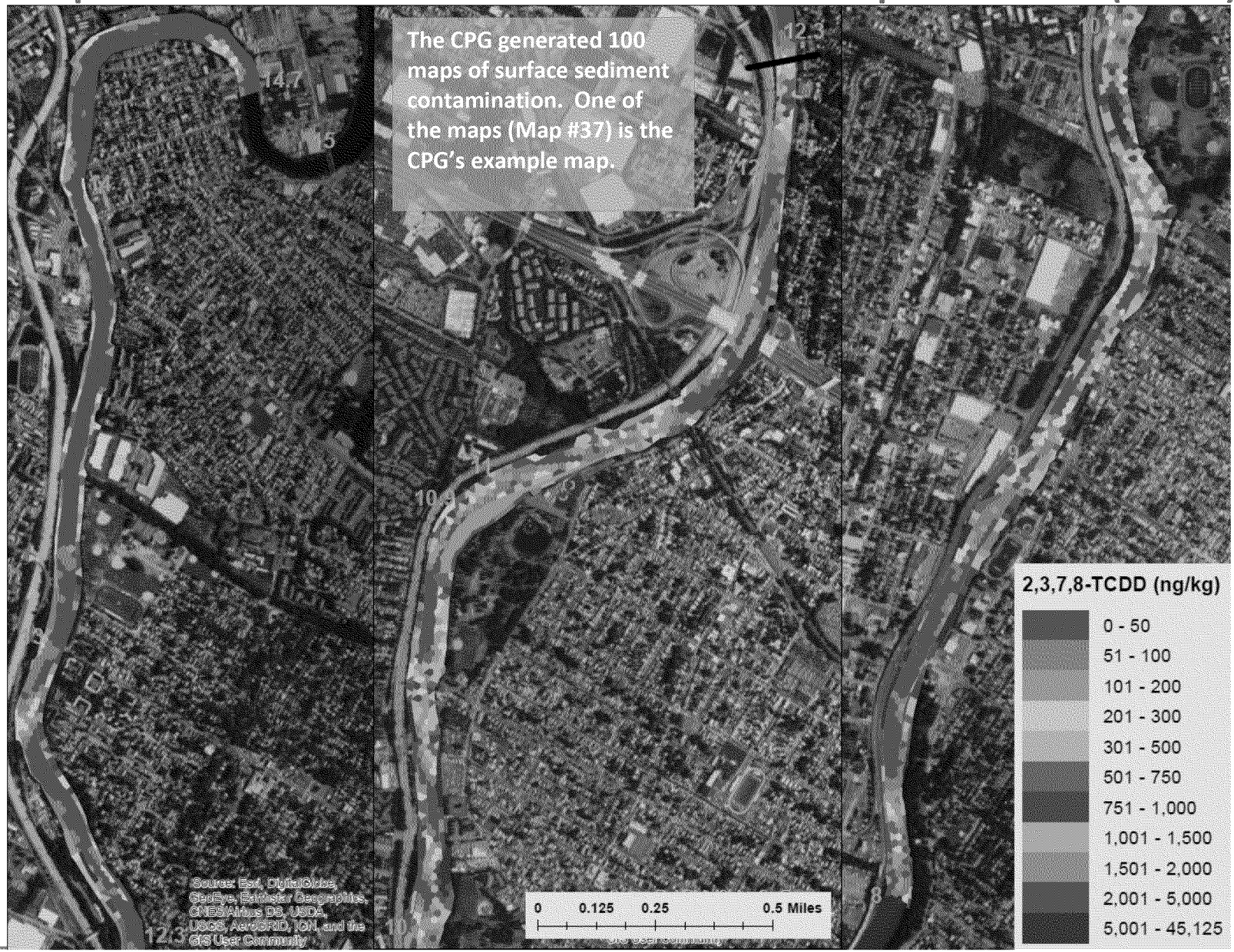
Consistent with Superfund Task Force Recommendations 3, 5 and 12

Additional Information About Proposed Interim Source Control Remedy for OU4

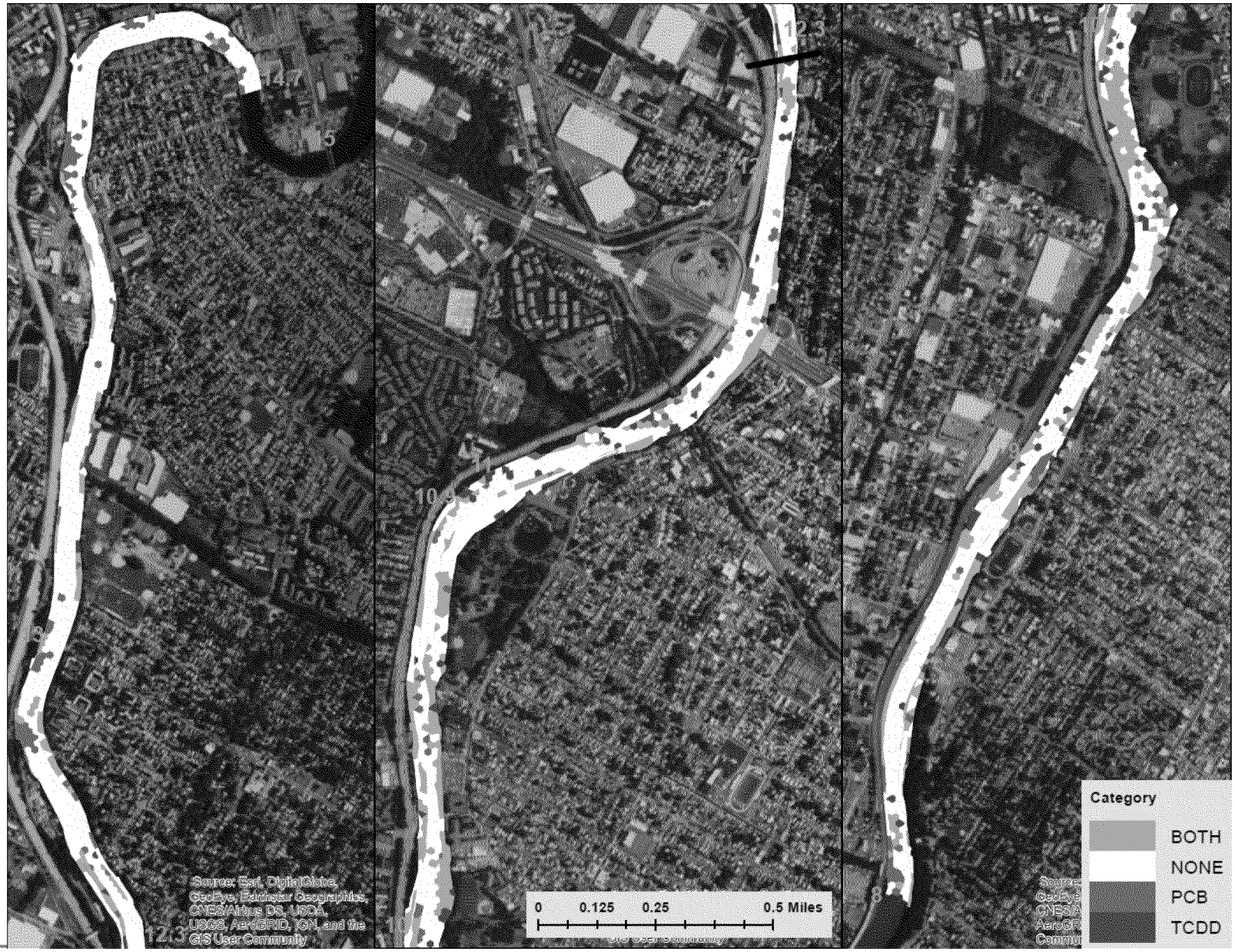
Proposed Interim Remedy for Source Control



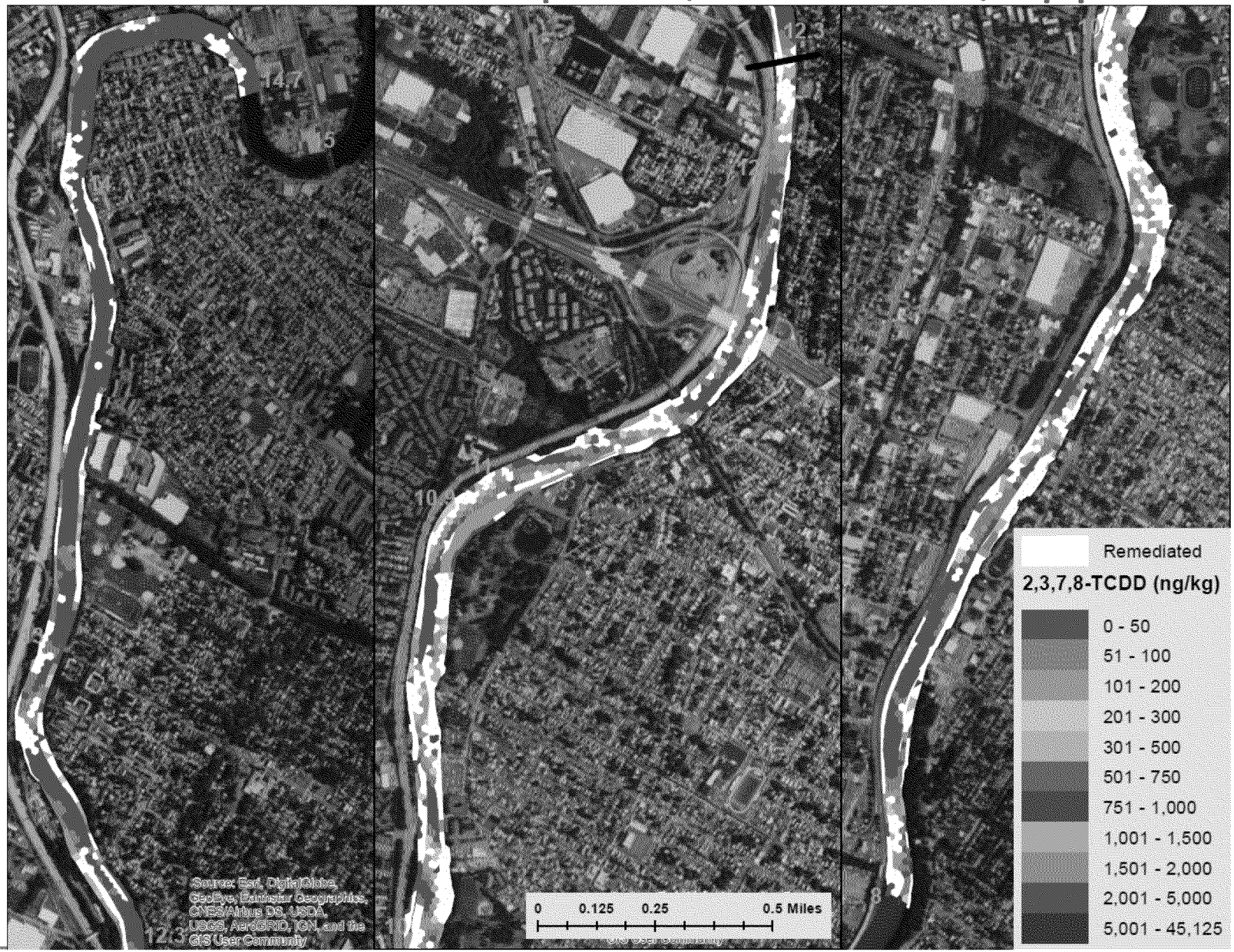
Example Conditional Simulation Map Result (#37)



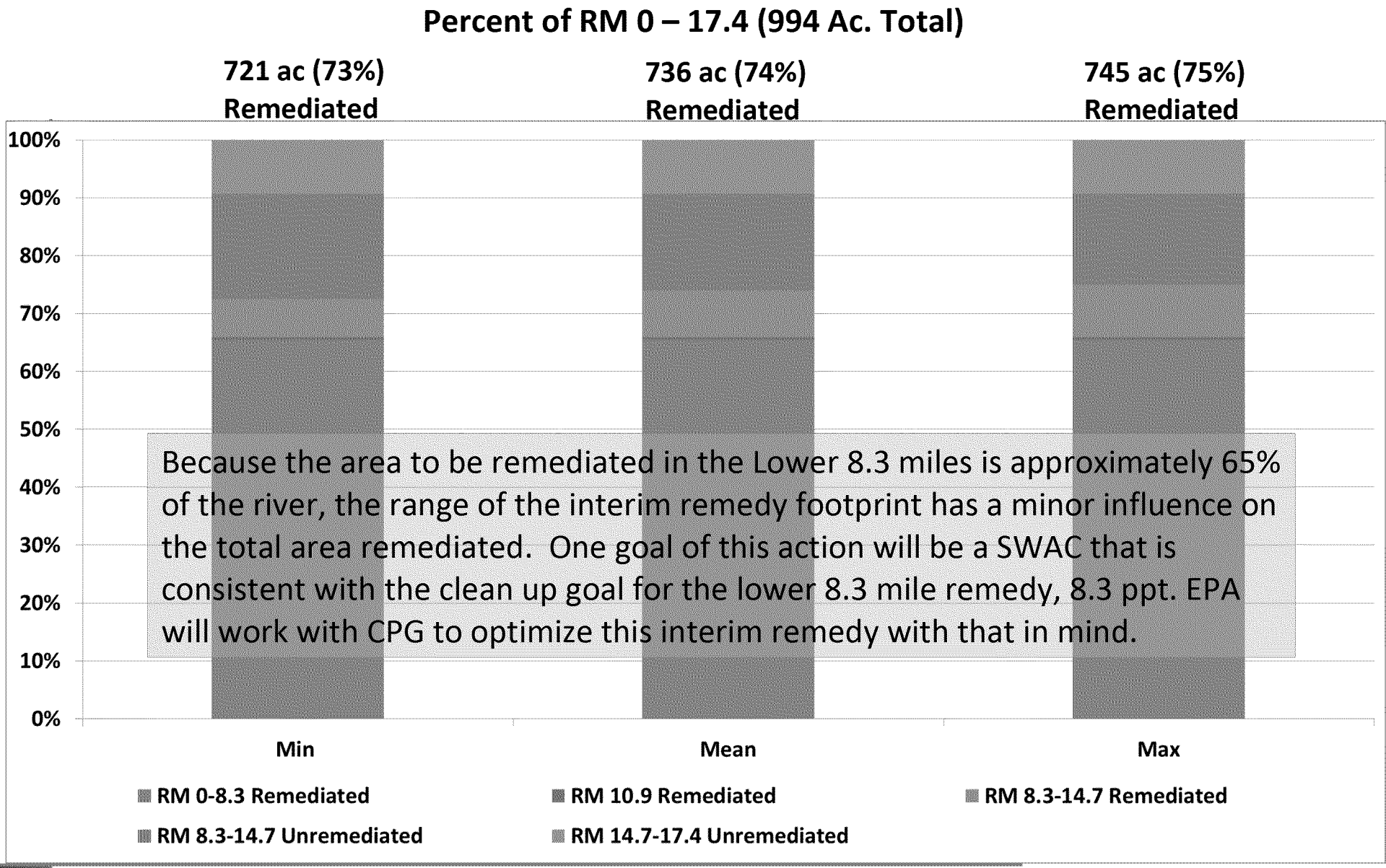
Remediation Footprint– Map#37, RAL=300ppt/1ppm PCB



Post Remediation – Map #37, RAL =300 /1ppm PCB



LPR Remediation Footprint - Lower 8-Mile plus Interim Remedy



Because the area to be remediated in the Lower 8.3 miles is approximately 65% of the river, the range of the interim remedy footprint has a minor influence on the total area remediated. One goal of this action will be a SWAC that is consistent with the clean up goal for the lower 8.3 mile remedy, 8.3 ppt. EPA will work with CPG to optimize this interim remedy with that in mind.

EPA Suggestion: Optimize Interim Action by Varying the Concentration That is Dredged

Comparison of results when using fixed RAL of 300 ppt dioxin to results when using an example of a potential variable RAL. Results are based on Surface Weighted Average Concentration (SWAC) in post-dredge sediments.

- 300 ppt RAL:
  - Area: 83 acres (RM 8 – 14.7)
  - SWAC: 84 ppt (RM 8 – 14.7)
    62 ppt (RM 8 – 17.4)

For comparison - From the Lower 8.3 Mile ROD: Sediment RG (comparable to SWAC) is 8.3 ppt and the sediment concentrations for carcinogenic risks of $1x10^{-6}$, $1x10^{-5}$, and $1x10^{-4}$ are $9.5x10^{-2}$, 1.6, and 22 ppt, respectively (56 fish meals/yr).

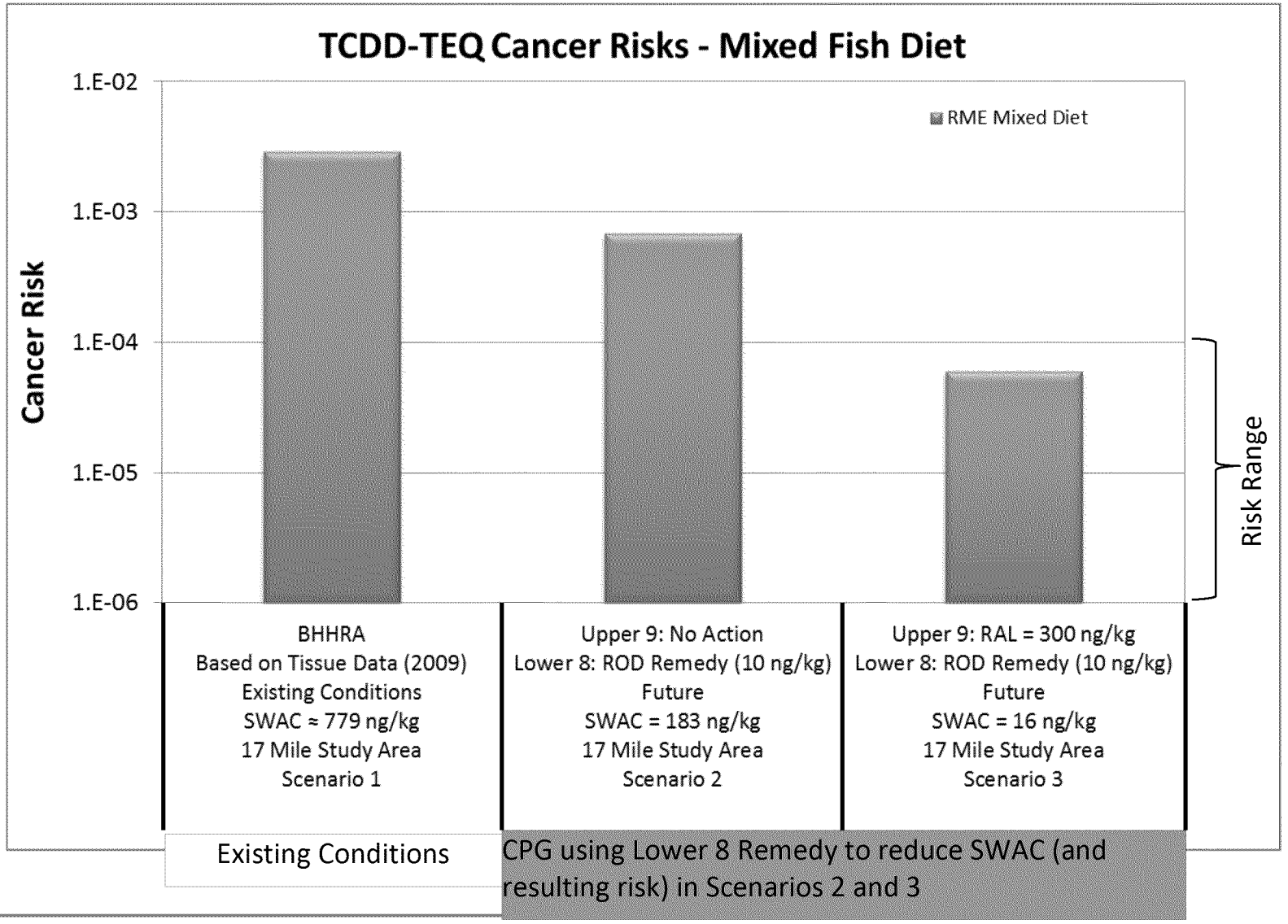
- Variable RAL Example:
  - 200 ppt (in areas with Limited Deposition/Some Erosion + Erosion>6 inches + Direct contact areas)
  - 300 ppt in other areas
  - Area: 89 acres (RM 8 – 14.7)
  - SWAC: 71 ppt (RM 8 – 14.7)
    52 ppt (RM 8 – 17.4)

Benefits (i.e., lower SWAC) are achievable by using variable RALs

Interim Remedy for Source Control: Risk Reduction

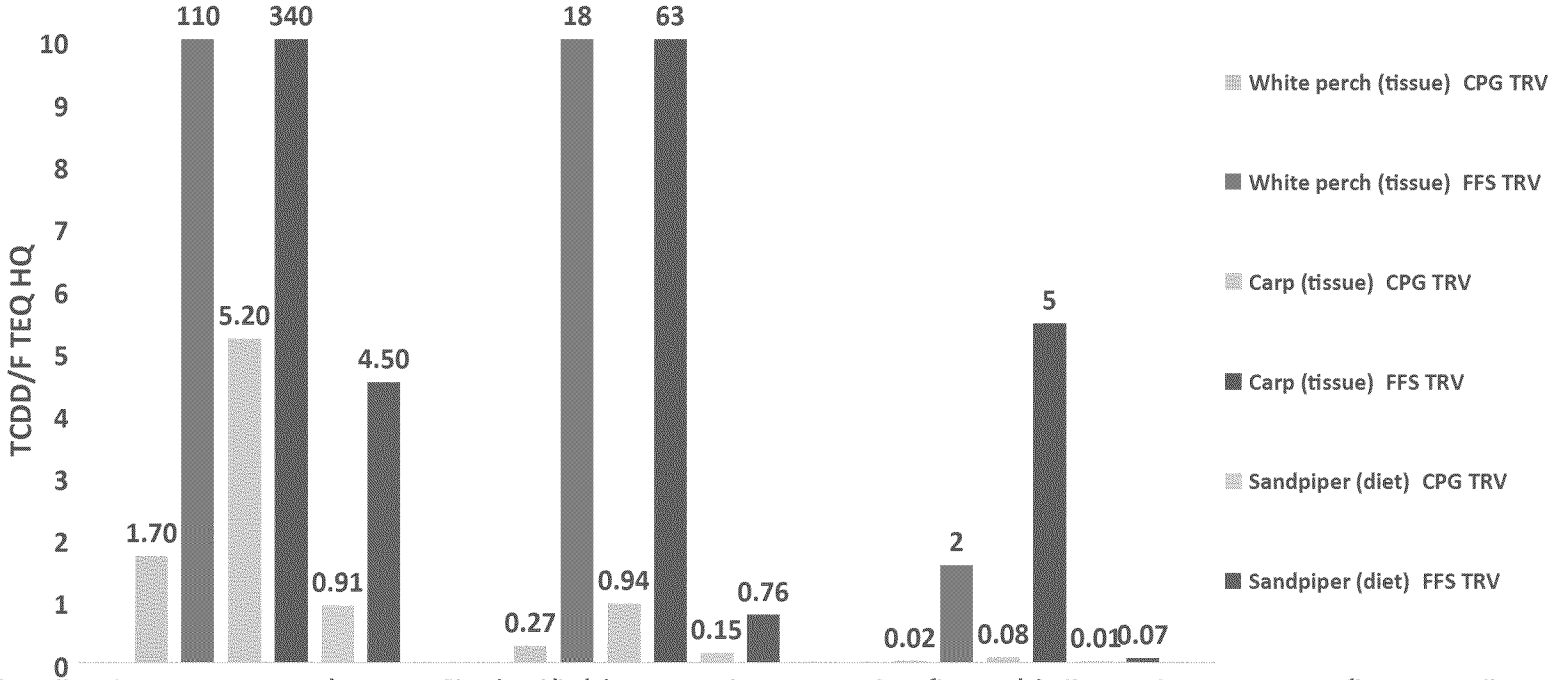
- SWAC (sediment concentration) can be used to estimate the human health and ecological risks post-remedy. This can be used to determine if the interim action achieves risk reduction.
  - Dioxin
    - Pre-remedy SWAC = 779 ppt (from mapping)
    - Baseline risk = 2.9×10^{-3} (from BHHRA)
    - Predicted post-remedy SWAC = 62 ppt (see 300 ppt scenario in previous slide)
    - Therefore, predicted post-remedy risk = 62 ppt/779 ppt x (2.9×10^{-3}) = 2.3×10^{-4}
  - A magnitude (approximate) SWAC reduction (e.g., 779 ppt reduces to 62 ppt) results in a magnitude (approximate) risk reduction; therefore, approximate 90% reduction in risk reported by CPG

Human Health Risk Estimates – Adult and Child Angler



Ecological Risk Estimates

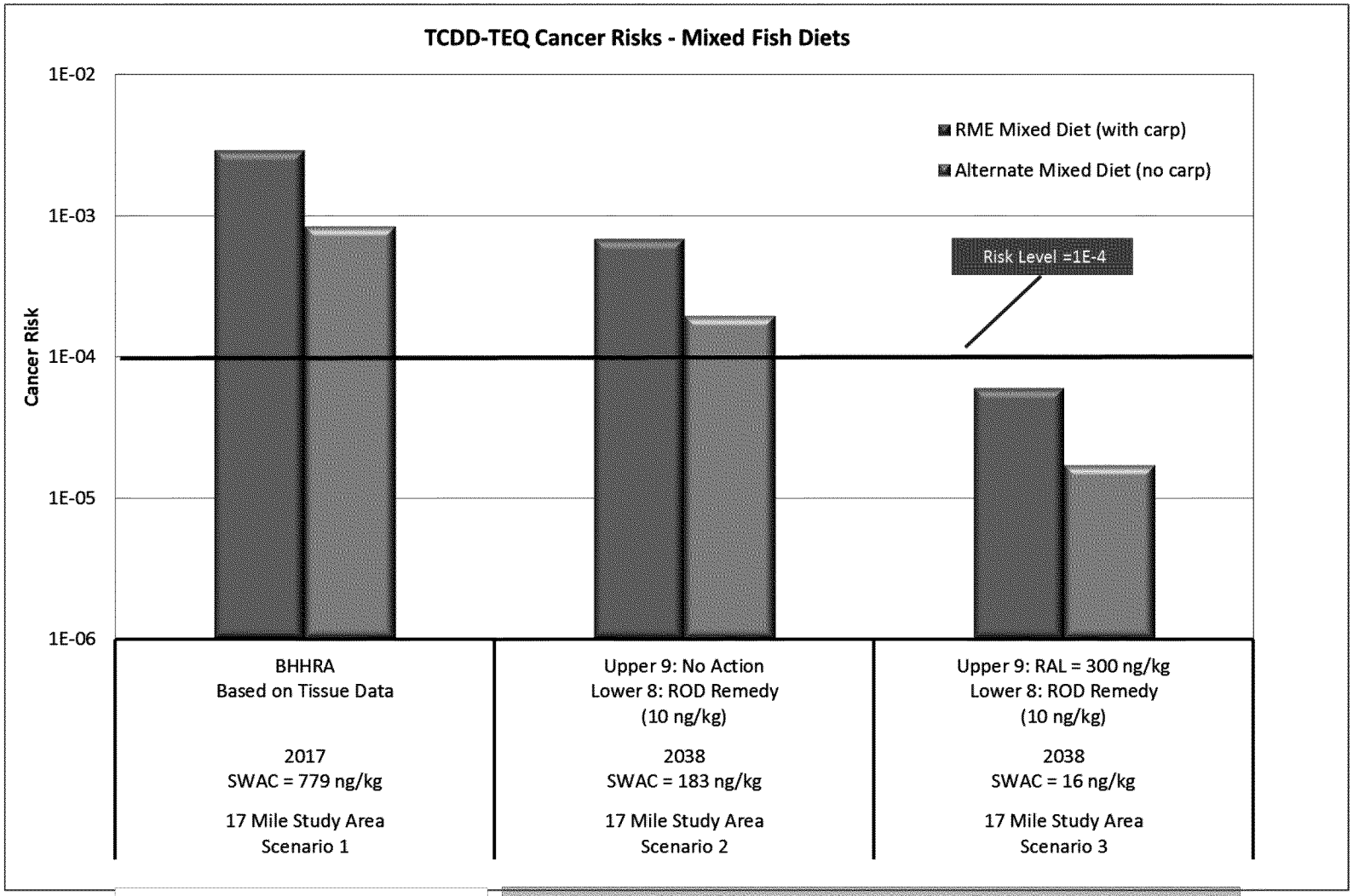
EPA allowed higher TRVs in the BERA, which results in lower CPG HQs as shown. The HQs shown may be considered upper and lower limits. EPA plans to re-evaluate TRVs in FS when PRGs are estimated. Ultimately, action will likely be driven by human health risk.



Existing Conditions

CPG using Lower 8 Remedy to reduce SWAC (and resulting risk) in Scenarios 2 and 3

Human Health Risk Estimates – Adult and Child Angler



Existing Conditions

CPG using Lower 8 Remedy to reduce SWAC (and resulting risk) in Scenarios 2 and 3

Uncertainty Summary

- Map #37 is the current best estimate of surface sediment contamination. Methods may incorrectly estimate concentrations being used to predict remediation areas
  - Sampling must be used in PDI to refine estimates
- Multi-beam data are not available in a large area (approximately 40-45%) that may need to be remediated (i.e., 2,3,7,8 TCDD concentrations > 300 ppt). Therefore, estimates of erosional and depositional areas may not be assigned for a substantial portion of the river and thus, recovery assumptions may be incorrect
  - Additional evaluation should be conducted to reduce this uncertainty
- CPG recovery estimates based on modeling appear to be ambitious
  - Further model improvements and simulations should be used to refine estimates

Assessing Risk Reduction from Interim Remedy

Scenario Number	Scenario Description	2,3,7,8-TCDD SWAC (ng/kg)	Basis for SWAC Used
1	Current baseline conditions	779 ng/kg RM 0-17.4 SWAC	CPG Mapping of "2010" dataset (CS #37)
2	ROD remedy only (no action in the upper 9 miles)	183 ng/kg RM 0-17.4 SWAC	Area-weighted average of the following: • For lower 8 miles, EPA ROD model prediction for 2038 for preferred remedy, based on 2016 ROD report figures (10 ng/kg). • For upper 9 miles, EPA ROD model No Action simulation presented at the 9/11 Interim Remedy meeting (511 ng/kg)
3	ROD remedy and Interim Remedy - Impact on site-wide risk	156 ng/kg RM 0-17.4 SWAC	Area-weighted average of the following: • For lower 8 miles, EPA ROD model prediction for 2038 for preferred remedy, based on 2016 ROD report figures (10 ng/kg). • For upper 9 miles, EPA ROD model 2038 prediction for a 300 ng/kg 2,3,7,8-TCDD RAL in the upper river, presented at the 9/11 meeting (27 ng/kg)

CPG using Lower 8 Remedy to reduce SWAC (and resulting risk) in Scenarios 2 and 3

